RELATIONSHIP OF SELECTED MOTOR FITNESS COMPONENTS WITH THE BATTING PERFORMANCE IN CRICKET

A SYNOPSIS
SUBMITTED FOR THE AWARD OF DEGREE
OF

Doctor of Philosophy

IN
PHYSICAL EDUCATION

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INTRODUCTION

The two teams of eleven players each bat in turn in the game of cricket, which is played on a rectangular 22-yard pitch in its centre, hoping to score a run while the opposition team fields. Each turn is referred to as an inning. The bowler bowls to the batters and the batters tries to strike the ball through his bat in a manner, so that he may move to the other side of the crease. The Marylebone Cricket Club (MCC) and the International Cricket Council (ICC) uphold the Laws of Cricket with additional Standards. The batting team hits until 10 batters have been struck out. The teams then trade places, and the team in charge of fielding starts to bat. After a predetermined number of over of six balls, when a batsman is out, the teams switch roles, with the fielding team batting. In professional cricket, a match might last anywhere from 20 over each side, and Over the course of five days, test cricket is played. Each hitter will keep on hitting until they are out. Test match and One Day International Playing Conditions Before the 16th century, in Southern England, cricket was first played. It had evolved into England's national sport by the end of the 18th century. Cricket began to be played abroad as a result of the British Empire's growth, and by the middle of the 19th century, the first international game had been played. The regulating organization of the sport, the ICC, has ten full members. Australia, England, the British and Wales, the West Indies, and Southern Africa are the regions where the game is most popular. (International Cricket Council, 2023) [1].

The motor fitness component is vital for being physically fit generally or in a specific game. Motor component-related fitness refers to your ability to develop essential physical abilities. These talents may be classified into six categories: strength, balance, coordination, power, response time, and speed. These aspects are important building blocks for sports achievement, but you also use some or all of them in your daily life. Balance and coordination, for example, are required in everyday tasks like walking and carrying dishes. Physically demanding vocations, such as firefighting or construction, labour, need strong motor skill-related fitness. Education components of skill-related fitness (McGraw-Hill) [2].

Coordination is often characterized as the ability to start, decelerate, change direction, and accelerates swiftly while retaining body control and minimizing speed

decrease. Athletes' coordination is typically characterized as their whole coordinative ability. These are the core components of technical abilities required to execute motor tasks ranging in difficulty from dynamic gross activities to fine motor control tasks, and they include adaptive ability, balance, combinatory ability, differentiation, orientation, reactivates, and rhythm. Coordinative talents are frequently seen as being most readily acquired during preadolescence, which is regarded as a critical phase for the advancement of skills. This time frequently shifts focus throughout adolescence, when the transition from broad to specific should occur. Most athletic activities that require coordination take fewer than ten seconds and require the ability to coordination of one or more sport-specific tasks at the same time (grabbing a football and then using evasive maneuvers and cuts to avoid being tackled in order to progress the ball further down the field). (Bompa & Buzzichelli, 2019) [3].

Aside from sport-specific abilities, coordination might be the most important predictor of success in a sport. Sports necessitate directional shifts in which lateral motions are performed in many planes of movement at the same time. Sports are frequently played in brief bursts of 30 feet (10 yards) or fewer before requiring a change of direction, acceleration, and/or deceleration. Athletes must be able to react with strength, explosiveness, and speed from varied body alignments since motions can be begun from numerous body alignments. Some athletes feel that coordination is mostly influenced by genetics and hence difficult to develop or improve to any meaningful level. Athletes with innate physical traits (physical size, strength, vertical & horizontal power, optimal body posture position) that are often correlated with great performance in sport captivate sports coaches. However, numerous coaches discover that these characteristics alone do not ensure success in sports that demand quickness. Unfortunately, due to the emphasis on physical traits, off-season programs frequently center on strength training and conditioning. If the neurological system, motor talents, and sport-specific actions at sport-specific speeds are not addressed during the off-season, they will have little opportunity to grow. It might take weeks or months for athletes to notice gains in their speed and coordination. Coordination should be taught as an essential part of the yearly training programmed (Verstegen & Williams, 2004) [4].

Athletes that prepare for power-oriented sports just through strength training and do not include sport-specific coordination training are not achieving their peak performance. Coordination and speed development at sport-specific speeds are sometimes overlooked or only addressed for brief periods of time throughout the pre-season. Coordination is a neuronal capacity that develops over time through numerous repetitions. Coordination is a "critical" and sometimes ignored component of sports performance, whether it is a basketball player cutting toward a pass or a football lineman pulling to trap a defensive lineman. Sideward speed, coordination, and agility might be just as crucial in baseball as speed and strength. The level of coordination necessary for successful performance has significantly grown as an outcome of athletes' performances in modern sports. The development of athletic execution, rhythm, and motion is closely tied to improved coordination. How rapidly a living thing can react to different stimuli is referred to as its ability to react swiftly. The potential relevance of its practical applications has led to substantial research on reaction time; for example, Driving with a slower-than-average response time might have catastrophic repercussions. Reaction times are affected by factors such as age, gender, fitness level, weariness, distraction from alcohol, type of personality, and whether the information is aural or visual (Kosinski, 2008) [5].

The model for information flow within an organism can be represented in this way:

Effectors Response to Stimulus Receptor Integrator

Specific illustrations of information flow in vertebrates include those shown below:

Activate the Sensory Neuron Brain or spinal cord motor neuron response. A stimulant is transformed in the form of electrochemical Sensory neurons provide a signal it extends the entire length of a sensory neuron, a neuron in the central nervous system, and finally a motor neuron. A gland may produce a chemical or a muscle may contract as a result of motor neurons. Only when the receptor on the spinal cord and the receptors that affect it are engaged do reactions more quickly than those involving brain processing take place. Sometimes known as spinal cord-mediated reflexes, these

reactions are those that only take place in, pass through or are controlled by the spinal cord (Purves et al., 2018) [6] .

In simple reaction time trials, one stimulus and one response are employed. Catching a fallen stick or hitting an icon when a light changes are two examples.

You must react to icon in "recognition reaction ability experiments" and symbols to ignore. Still, there is only one proper stimulus and one appropriate reaction. An illustration would need to disregard other spoken words that are not signals while catching a dropped stick with a word cue. 'Choice reaction time' tests involve a variety of stimuli and reactions. Their actions must correspond to the right stimulus. In this kind of experiment, a letter that matches a printed letter prompt is typed (Luce, 1986) [7].

The range of motion of a joint or set of joints, or the capacity to move joints efficiently, is referred to as flexibility. Muscular imbalances brought on by a lack of flexibility can result in injuries to certain body parts. Your ability to move freely through your joints and muscles may have a substantial impact on both your daily activities and athletic performance. Physical activities that improve mobility across several body planes include gymnastics, yoga, Pilates, karate, and ballet. You may keep the severity of pain and injury symptoms to a minimum by putting flexibility first in your way of living. Stretching is often not done by people, but those who do may perform better. For the long-term avoidance of injuries, a flexible muscle is necessary. Whatever stretching technique a person decides to use, following basic rules can help them succeed. Raising the temperature of the articular and surrounding tissues is necessary prior to stretching; Muscle has the ability to stretch and if they are not warmed up before stretching, injury is more likely to occur, equivalent to how an elastic band would snap when stretched quickly without a slow increase in range of motion. By engaging in a general aerobic workout, such as brisk walking or running for 5–10 minutes, a person can raise the temperature of their muscles, tendons, and ligaments. The muscles have become more supple and ready for a flexibility workout when this is finished. Below are four types of stretching techniques that should be done to enhance an individual's flexibility and mobility (Shrier, 2004) [8].

Speed endurance is one's capacity to keep running at most extreme or close greatest speed for a continued time-frame. Certain running athletes look for speed continuance to perform better at their occasions. Alternate athletes, for example, football or hockey players, can profit by speed perseverance in their particular games by exploiting the capacity to remain at close most extreme speeds reliably. Creating speed perseverance involves legitimate preparing joined with appropriate eating routine and in addition planning for the explicit occasion in which the competitor will partake. Most preparing strategies incorporate running for set time-frames, trailed by adequate rest and recuperation. Runners will tailor their speed perseverance exercises to their particular running events, however different athletes may shape a normal that takes a shot at speed continuance all in all. The standard comprises of running at 90% of most extreme speed and exertion for a supported time-frame, at that point resting for a shorter time-frame. The run might be rehashed now, contingent upon the competitor's needs. Amid the running, shape is similarly as essential as force, and the competitor must concentrate on running hard as well as running admirably. An appropriate walk will set up the muscles for progressively successful running and continuance. Legitimate recuperation is an essential advance amid speed aerobic exercise. Lactic corrosive can develop in the legs after exercise. It is a side-effect of consumed glycogen, which is the body's favored fuel amid exercise. Lactic corrosive can develop both amid and after exercise, influencing a muscle's capacity to work at its pinnacle. Amid exercise, the athlete must remain appropriately hydrated to guarantee oxygen conveyance to the 16 muscles. After exercise, more hydration is crucial, as it is a decent eating routine that replaces supplements lost amid exercise. Athletes may take part in lactic corrosive edge preparing as a major aspect of their speed aerobic exercise too (Midgley, McNaughton, & Jones, 2007) [9].

STATEMENT OF THE PROBLEMS

The problem is state as ***"Relationship of selected motor fitness components with the batting performance in cricket".***

OBJECTIVES OF THE STUDY

The objectives of the study will be as follows:

1. To determine the present status of all selected motor fitness components of university level cricket players.

2. To find out the relationship of selected motor components and the batting performance of university-level male cricket players.

DELIMITATIONS OF THE STUDY

The study will be delimited to the following aspects:

1. The study will be delimited to 100 male cricket players only.

2. The study will be delimited to the university-level male batters from the following Universities only:
    - University of Allahabad
    - Banaras Hindu University
    - Purvanchal University
    - Ruhelkhand University
    - LNIPE Gwalior
    - Chatrapati Sahu Ji Maharaj University, Kanpur

3. The study will be delimited to participants within the age range of 18 to 25 years.

4. The study will be further delimited to the assessment of the following motor components:
    - Flexibility (hamstring & lower back)
    - Agility
    - Reaction ability
    - Speed endurance
    - Eye-hand coordination
    - Balance (dynamic)

5. The study will be delimited to the assessment of batting performance, with specific emphasis on the perfection of vertical and horizontal bat strokes.

LIMITATIONS OF THE STUDY

1. The factors considered as limitations for the study will include the food habits, climatic conditions, economic status, and lifestyle of the subjects, as these cannot be controlled.

2. The differences arising from cultural, economic, social, and religious backgrounds of the subjects will not be considered.

3. The participation of the subjects in local cricket tournaments will not be controlled.

HYPOTHESIS OF THE STUDY

- There will be a significant relationship between selected motor fitness components and the batting performance of university- level male cricket players.

DEFINITIONS AND EXPLANATIONS OF THE TERMS

Flexibility (Hamstring & Lower Back)

Definition: Flexibility refers to the capacity of a joint or series of joints, along with surrounding muscles, to achieve and maintain a complete range of motion without restriction (American College of Sports Medicine, 2021) [10].

Explanation: This study emphasizes flexibility in the hamstrings and lower back regions. Enhanced flexibility allows cricketers to assume optimal batting positions fluidly, facilitate effective trunk rotation during strokes, and minimize injury risks such as strains. It also supports agile footwork and precise stroke play when adapting to varying ball lengths (Woolmer et al., 2008) [11].

Agility (Co-ordination)

Definition: Agility is defined as the capability to swiftly alter the body's position or direction with precision, speed, and preserved balance (Sheppard & Young, 2006) [12].

Explanation: In cricket, agility is vital for rapid foot adjustments in response to diverse bowling styles. Batters with superior agility can efficiently advance, retreat, or

shift laterally to position them for ideal shot execution. Tests like the shuttle run effectively evaluate this skill in changing directions quickly (Jeffreys, 2013) [13].

Reaction Ability

Definition: Reaction ability is the proficiency to detect a stimulus and initiate an appropriate response promptly, often quantified by reaction time—the duration from stimulus onset to response start (Magill & Anderson, 2017) [14].

Explanation: For batting in cricket, strong reaction ability is indispensable, enabling players to assess a ball's velocity, trajectory, and path, then select and execute the right stroke instantly. This is particularly beneficial against fast bowling, improving shot timing and overall performance (Bartlett, 2007) [15].

Speed Endurance

Definition: Speed endurance is the competence to uphold repeated high-speed efforts or intense movements over time with minimal performance drop-off (Bangsbo, 1994) [16].

Explanation: Batters require speed endurance for sustained wicket-running in prolonged innings, as well as for preserving reflexes, stroke accuracy, and focus during extended play. Assessments like the 150m run test are standard for evaluating this endurance in high-intensity scenarios (Noakes, 2003) [17].

Eye–Hand Coordination

Definition: Eye-hand coordination involves the integration of visual perception with manual actions to execute tasks accurately, swiftly, and effectively (Schmidt et al., 2019) [18].

Explanation: In cricket batting, this skill is fundamental, as it allows players to track the ball's path visually and synchronize bat movements for optimal contact. Superior coordination enhances stroke timing, accuracy, and adaptability across different game conditions (Müller & Abernethy, 2006) [19].

Balance (Dynamic)

Definition: Dynamic balance is the skill to sustain postural stability and bodily control during movement or positional shifts (Winter, 1995) [20].

Explanation: Dynamic balance is essential for cricket batting, supporting techniques like front-foot drives, back-foot shots, or defensive plays. It enables efficient weight

transfer, power generation, and composure against fast or spinning deliveries. The modified Bass test serves as a reliable tool for measuring this attribute (Hrysomallis, 2011) [21].

SIGNIFICANCE OF THE STUDY

- This study will help the batters to work on the selected motor fitness components in order to improve their batting performance
- The conclusions of this study will contribute fresh information to the field of cricket and will provide more opportunities and recommendations for cricketers
- This study will provide guidelines for improving the performance of cricketers.
- The results of this study will assist cricketers in self-evaluation.
- This research will provide a scientific basis for coaches and trainers to plan effective training schedules for cricket.
- It will further add to the body of knowledge in the area of sports training and motor fitness.

REVIEW OF RELATED LITERATURE

Bagchi, (2020) [22] examined the connection between the strength and flexibility of a few specific body components and the speed of the ball during fast bowling in cricket. 25 male cricket players from the LNIPE Gwalior who were between the ages of 17 and 23 served as the study's participants. Because they successfully finished all test items, about 30 gamers were chosen for the research. Those who weren't able to finish all the test items were thus disqualified. According to the study, there is a substantial correlation between a player's ankle, leg, back, arm, and wrist strength and the ball's velocity while fast bowling in cricket. In fast bowling in cricket, there was no discernible association between abdominal strength and ball velocity. In fast bowling, there was a strong correlation between ball velocity and hip, spine, and wrist flexibility.

Raman, A. (2020), [23] "Relationship between grip strength, leg power, agility, reaction time, and cricket performance in male players. LNIPE, Gwalior". Raman- Conducted tests on 30 male cricket players from graduated and undergraduate courses at LNIPE, Gwalior to determine the relationship between grip strength (grip dynamometer); leg power (standing broad jump); agility (40 yards shuttle run); and hand or foot reaction time and performance was the average of subjective rating of 3 experts during practice and match situation. Product moment co-relation was employed to statistically treat the data. It was concluded that 1) hand and foot reaction time is the most important variable of prediction in the cricket playing ability, and 4) ability is an important factor in the prediction of performance in cricket.

Sharma and Tyagi, (2011) [24]- Table tennis players from Delhi were chosen at random to participate in an investigation of the impact of specialized training performance on the physiological and motor components of the sport. The volunteers took a test for their physical and physiological parameters in order to perform the study in accordance with the methodology. The metrics utilized were systolic blood pressure, diastolic blood pressure, pulse rate, and vital capacity. Breathe holding rate and cardiovascular endurance. Speed, flexibility, power balance, and agility were the physical criteria. The test subjects were put through specialized player-specific training. Comparing pre- and post-test results allowed researchers to determine how

the players responded to the particular instruction. The outcome shows that there were substantial differences in the comparative control group's physiological (systolic blood pressure, pulse rate, and breathing holding rate) and fitness (speed and agility) components.

Samshuddin, 2011 [25] Examined how specific motor components and performance metrics were affected by asana, pranayama, meditations, and game-specific training among district-level cricket players. 48 male college-level cricket players with ages ranging from 18 to 25 were chosen at random from the Madurai district's associated clubs. Three competent instructors initially evaluated each subject's subjective cricket-playing abilities. The subject was divided into 3 groups by the 3 experts, each with 16 individuals, using a matching technique based on their cricket playing abilities. The first group participated in game-specific field training, the second group received game-specific field training with yogic exercises, and the third group (the control) received no special instruction. The cricket players' playing skills and level of fitness were to be improved by the game-specific field training routine. The investigators of the research created game-specific training packages that were implemented over the course of 12 weeks, five days a week, two sessions each day, with each session lasting two hours. Before or after the game-specific field training, group 2 received 45 minutes of yoga instruction. Selected asana, pranayama, and meditation techniques are all a part of the yoga practice. In order to assess the individuals' level of physical fitness, the scientists employed the motor components of speed, explosive strength, endurance, and flexibility as variables for the 50-meter run, standing long jump, 12-minute run, and sit-and-reach test. The skill level of each individual as a cricket player was evaluated subjectively by their trained coaches. The investigators provided advice for subjective grading. One day before and one day after the experimental therapy, the pre and post-tests were completed. The gathered information was examined using an analysis of covariance. To ascertain which of the paired means differ substantially from one another, Schaffer's test was employed as a post hoc analysis. The study's findings indicate that both game-specific training and game-specific training paired with yogic practice had beneficial effects on the motor components and performance metrics.

Manikam, (2011) [26] Find out how certain psychological and technical skill levels among college-level football players are affected by strength training regimens with and without yogic practice. 15 guys between the ages of 18 and 25 were divided into three match groups. Group 1 served as the control group while Groups 2 and 3 received strength training but not yogic practices, respectively. For 12 weeks, the strength was administered in the morning session for 2 hours, four days each week. Three psychological variables, namely anxiety and achievement motivation, were chosen as variables because they may have a direct correlation with the performance of football players in a competitive setting. The yogic package was given to each group for 45 minutes each for 12 weeks, four days per week, for two hours each day in the morning session. The evaluation of these factors involved the use of standardized questionnaires. Three certified coaches evaluated the athletes' talent levels on a subjective basis. The gathered data were examined using an ANCOVA (analysis of covariance) model. To ascertain the level of the importance of the variation among the matched means, Schaffer's test was used as a post hoc analysis. The outcomes show that training made a considerable improvement in the players' performance. The outcome also shown that, in comparison to other groups, strength training with the yoga practice group significantly improved all the players' chosen psychological and technical ability levels.

Samshuddin and Kalidasan, (2010) [27] Investigated the effects of yoga practice and game-specific field training on a few physical, physiological, psychological, and performance characteristics in college-level cricket players. Approach: topics the subjects were 64 college-level cricket players, whose ages varied from 18 to 25. Utilizing statistical methods, the analysis of covariance was utilized to examine the data gathered. To ascertain which of the paired mean differences is statistically significant, one must do Schaffer's test as a post hoc analysis. Result: A bar diagram of the results shows that there was a substantial difference between the groups. When it comes to the specified metrics, Group 2's cricket players at the collegiate level have showed a great development.

Ahmadi, Mina, et al., (2021) [28] The purpose of this research was to investigate the effects of eight weeks of plyometric jump training (PJT) on jumping biomechanical characteristics and female basketball players' physical fitness levels

while they were playing at home. The seventeen participants were split into two groups: one was a sand group (SsG), and the other was a hard group (RsG). Indoor basketball lessons were completed successfully by both groups in equal measure. Participants were evaluated for a variety of criteria, including jump-related biomechanical characteristics, the growth of muscular strength, and other aspects. A two-way analysis of variance indicated that there were substantial group x time interactions between DJ height and CMJ peak force, with RsG and SsG being the beneficiaries of these interactions. There were additional significant interactions found for heart rate and one repetition maximum, with both of them favoring SsG. It was noticed that there were no additional group x time interactions. Specific adaptations in jump-related biomechanical variables and physical fitness were brought about in women's indoor basketball as a result of the kind of surface that was used during PJT. Based on the requirements of an athlete, physicians might recommend a certain kind of surface for PJT in order to get the best possible outcomes.

Kumar A, Jadiya MK, (2021) [29] Plyometric training and strength training were both evaluated for their ability to improve power, standing long jump, and vertical jump performance in college-level volleyball players. The purpose of the research was to compare and contrast the different types of training. A total of fifty individuals were split into two groups: one group was given plyometric training, while the other group was given strength training. Before and after the intervention, data were gathered for both the pre-test and the post-test as well. The findings demonstrated that both groups had made great progress in terms of governance. Both groups had a considerable increase in their mean vertical jump height, with the plyometric training group surpassing the strength training group during the whole training period. Within the context of enhancing sports performance, the research underlines the possibility for scientific involvement from physical therapists. In light of the findings, it seems that plyometric training has the potential to be an effective method for enhancing athletic performance.

Shaukat, H., and A. Javed, (2020) [30] determine the degree of association between the strength of the handgrip and the anthropometric factors of the dominant side of the arm. Through the use of convenient sampling, this cross-sectional research was carried out in Lahore on a total of 241 male cricket players during the months of

July 2017 and August 2018. Standard anthropometric procedures and formulae were used in order to quantify the anthropocentric characteristics of the dominant side together with the handgrip strength of the dominant side. In order to determine the amount of the association, the Pearson correlation coefficient and linear regression analysis were taken into consideration. The average age of 241 players is 25.19 years, with a standard deviation of 3.493 years. Twenty-four players, or thirty percent, were batsmen, 69 players, or 29 percent, were bowlers, 14 players, or six percent, were wicket keepers, and 84 players, or 35 percent, were all-rounders. A mean handgrip strength of 65.783±3.365 kg was observed among the participants in the research. There were several anthropocentric variables that were measured, and the mean values for these variables were as follows: triceps skin-fold thickness (13.807±0.815 mm), sub-scapular skin-fold thickness (16.552±0.763 mm), mid arm circumference (33.398±1.274 cm), arm muscle area (67.381±5.149 cm2), arm muscle girth (29.070±1.116 cm), arm area (88.986±6.643 cm2), arm fat area (21.605±1.836 cm2), and arm fat index (24.281±1.055). The handgrip was found to have a positive correlation with the triceps skin-fold (r=0.608, p=0.001), the mid-arm circumference (r=0.738, p=0.001), the upper arm muscle area (r=0.694, p=0.001), the upper arm muscle girth (r=0.695, p=0.001), the total arm area (r=0.740, p=0.001), the upper arm fat area (r=0.728, p=0.001), the sub-scapular skin-fold (r=0.215, p=0.001), and the arm fat index (r=0.158, p=0.013). There was a substantial positive connection between handgrip strength and each of the anthropocentric factors. Handgrip strength is a standard indication that may be used to attain the aim of exceptional performance. It can also be used as a helpful selection factor for cricket and other activities that involve gripping.

Wang, Min-Hsien, et al., (2020) [31] The purpose of this research was to investigate the effect that plyometric training has on the electrical signals that are produced by the lower limb muscles of volleyball players while they are continuously blocking. Each participant in the study was assigned to either a plyometric training group (PTG) or a control group (CG). When jump blocks were being performed, electrodes were inserted on the rectus femoris, biceps, anterior tibia, and gastrocnemius muscles. This allowed for the collection of data by wireless electromyography. After six weeks of therapy, the researchers discovered that the mean frequency of rectus femoris and tibialis anterior muscles in PTG was much

lower than in CG training. This was the case regardless of the kind of training. PTG's blocking agility improved by 6.26 percent, while the height of their highest vertical leap from their center of gravity grew by 3.33 percent. During prolonged jumps, the findings provide vital insights into the neuromuscular state of volleyball players. Furthermore, the findings imply that six weeks of adequate plyometric training may greatly enhance the performance of volleyball players.

METHODOLOGY AND PROCEDURE

In this chapter, the selection of subjects, selection of variables, criterion measures, collection of data, administration of tests, design of the study and statistical techniques for the analysis of data have been described below-

SELECTION OF SUBJECTS

There will be 100 male (n-100) cricket players (batters), both elite and sub-elite, will chose randomly as the subjects for the study. The age range of the subjects will be 18 to 25 years.

SELECTION OF VARIABLES

Performance based Motor Fitness Variables

a) Flexibility (lower back & hamstring)
b) Aagility
c) Reaction ability
d) Speed endurance
e) Eye – hand co-ordination
f) Balance (dynamic)

Performance based Batting Analysis

All cricket shots (vertical and horizontal) bat strokes

CRITERION MEASURES

The criterion measures adopted for the study would be as follows:

Variable	Criterion Measure / Test	Recorded As (Unit / Method)
Agility (Co-ordination)	Shuttle Run	Time in seconds
Reaction Time	Nelson Hand Reaction-Time Test	Time in seconds

Flexibility	Sit-and-Reach Test	Distance in centimeters (cm)
Speed Endurance	150 m Run Test	Time in seconds
Eye Hand Co-ordination	Ball-Throw Accuracy at a Target	Number of successful hits / trials
Balance (Dynamic)	Modified Bass Test	Score based on landing accuracy & stability

COLLECTION OF DATA

Data will be collected from inter-university level cricket players who specialize as batters. Participation in the study will coordinate through university coaches, who facilitate the involvement of their respective athletes. Prior to the administration of tests design to assess the relationship between motor fitness components and batting performance in cricket, all participants will provide with detailed instructions regarding the procedures, objectives, and expectations of the study. Written inform consent will also obtain from each participant to ensure ethical compliance and voluntary participation.

DESIGN OF THE STUDY

For the study, the correlation design will be employed. A single set of analysis units will acquire, ideally at random; each participant will be measure with all selected variables accordingly.

ADMINISTRATION OF TEST

Motor components and batting performance:

Agility Test (Shuttle run)

Objective of the test: - To measure agility of batters.

Equipment: 2 blocks of wood (2x2x4) at each test station, a timer that is accurate to one second, and a floor space wide enough to accommodate a shuttle run of 10 meters**.**

Procedure: Two parallel lines, 10 meters apart, are marked on the floor. A line of 2x2x4 dimensions will be maintained by two blocks. The subjects are positioned behind the starting line. When the signal "go" is given, they will sprint to the other line, pick up the block, return to the standing line, and put the blocks, before repeating the process with the second block.

Scoring: Accurate timekeeping down to the second will be used to calculate the score. Each student will be given two trials, with the best score being chosen. Students who fall or slide will give another trail, and the stopwatch will start when the signal goes and cease when the second block carries past the line.

Nelson Hand Reaction Time Test

Objective of the test: This test will measure reaction time of batters.

Equipment: A Nelson reaction timing scale, a chair and table or a desk chair, paper-pencil, and a clipboard are all required.

Procedure: After conducting a practical demonstration for the group, the tester will instruct the subject to sit in the chair with his forearm and hand resting on the table so that the tip of his thumb and index finger is ready to pinch, about 3 to 4 inches beyond the edge of his thumb and index finger are in a horizontal position. Currently, the tester is holding the timer stick by its top edge such that its bottom edge hangs between the subject's thumb and index finger, aligning the mark baseline (not the edge) of the timer with the subject's thumb and forefinger. The test subject will not be allowed to touch the hanging stick timer; the tester will make sure of it. The concentration zone is the darkly colored region encompassing the 0.120 and 0.130-second lines; have the patient now stare at this. Subjects sternly instruct will not to glance at the tester's hand or move it upward or downward while striving to grasp the falling stick timer. Additionally, the tester will signal "ready" before exiting the stick. Twenty trials will each be performed on a subject.

Scoring: When the subject catches the falling stick timer, the time will be read from the stick right above the upper border of the thumb. The results of the five quick trials and the five slow trials will be discarded out of the twenty trials, and the test score will be calculated as the average of the middle ten trials.

Sit and reach test: (for flexibility)

Objective of the test: This test will assess the flexibility of both the lumber region and hamstrings muscles of batters.

Equipment: A testing box or a flexor-meter and a yardstick.

Procedure: The individual will sit on the floor with straight knees, request that the shoe be removed, and place his feet against the testing box. The subjects will now request that one hand be placed on top of the other such that the middle fingers on both hands are the same length when joined. The subject will be instructed to stoop forward and lay his hand over the measuring scale, resting on top of the testing box with its 10-inch mark aligned with the front edge of the box. The patient will then request to glide his hands as quickly and without bouncing along the measuring scale and hold the furthest position for at least one second.

Scoring: Each subject will do three trials, with the best result—the one closest to an inch becoming the record. Ten inches will be subtracted from the record reading to get the flexibility score, which will be compared to the standard in the table.

150 meters run test (Speed Endurance)

Objective of the test: This test will evaluate speed endurance of batters.

Equipments: Measuring-tape, Starter clapper and Stop-watch.

Procedure: For this, the maximal effort sprinting over 150 meters using a standing or crouching start approach will use. The results will be calculated as the amount of time between the "clap" and the runner completing the race. The outcome will be rounded up to the next digit. Digital electronic watches will be utilized for this purpose.

Scoring: the below mentioned calculation will help to find out the agility tolerance:

Agility tolerance = (travel destination / time taken) Meter / Seconds.

Eye-hand coordination (catching and throwing a ball at a target test):

Objective of the test: This test measures eye-hand coordination.

Equipment: Rubber ball, Stop-watch, Firm and plane wall, Assistant.

Procedure: After completion of warm-up athlete stands 2 meters away from the wall. After the command of "GO", the subject will throw a tennis ball using their right hand towards the wall's surface and collect it with their left hand. The next catch should be thrown by the subject using their left hand and caught with the right hand. This procedure simultaneously continues for 30 seconds. After completing my first the next will do the same procedure. Record the number of catches by the tester.

Scoring: Outstanding = >35, more than average = 30-35, normal = 25-29, below average = 20-24, and bad = 20.

Balance (modify bass test for dynamic balance):

Objective of the test: This test will evaluate a person's ability to leap precisely and keep their balance while doing several hops as well.

Equipment: yardstick, colored marking tape that is 3/4 inches wide, and a stop-watch.

Procedure: First, levels and 1 to 10 will mark with eleven pieces of colored marking tape that are 3/4 x 1 size, cut, and glued on the floor. These marking dots will acquire by correctly measuring the 30" and 15" ranges. Following a demonstration of the test, the individual will instruct to stand with their right foot on the standing tape marking and make a left-footed leap to the first tape mark. The subject has to keep his balance steadily on the left foot for a maximum of five seconds, at which point he must jump to the second tape mark via the right foot, repeat the process that was started at the first mark, and continue to the following tape places serially with alternate foot placements up to the tenth tape mark. The subject is informed in no uncertain terms that he will receive a score for each second he remains balanced at a position for a maximum of five seconds as well as that his toes must completely cover the tape specified at each spot. The individual must also be aware that shifting the support of the ball of the foot or jumping would result in a penalty.

Scoring: At each landing spot, 5 points will award for a accurate landing, 5 points for each second of steadily balancing on the ball of the concerned foot, and zero

points for incorrect jumping. The maximum points that may be scored at every single landing spot are 10, making the theoretically top score of the test at box 10=100. However, on a wrong landing, the subject will allow to reposition by hopping for the 5-second balance points and to continue the test.

Batting performance:

Objective of the test: To measure batting performance of batters.

Procedure: A panel group consisting of three (NSNIS) coaches. A trial of 100 batters and the score will give according to their batting performance.

There will be some criteria to check the vertical and horizontal batting strokes and those are:

1. All kinds of vertical bat stroke.
2. All kinds of horizontal bat stroke.

Scoring: There will be grade systems, which will be distributed in the following three parts:

- Grade A: The best group of batters considers in 7 to 10 marks.
- Grade B: The average group of batters considers in 4 to 6 marks.
- Grade C: The poor group of batters considers in 0 to 3 marks.

STATISTICAL TECHNIQUE FOR ANALYSIS OF DATA

Based on the collection of data the descriptive statistics and Pearson product-moment correlation will be used. The level of significance will set at 0.05%.

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